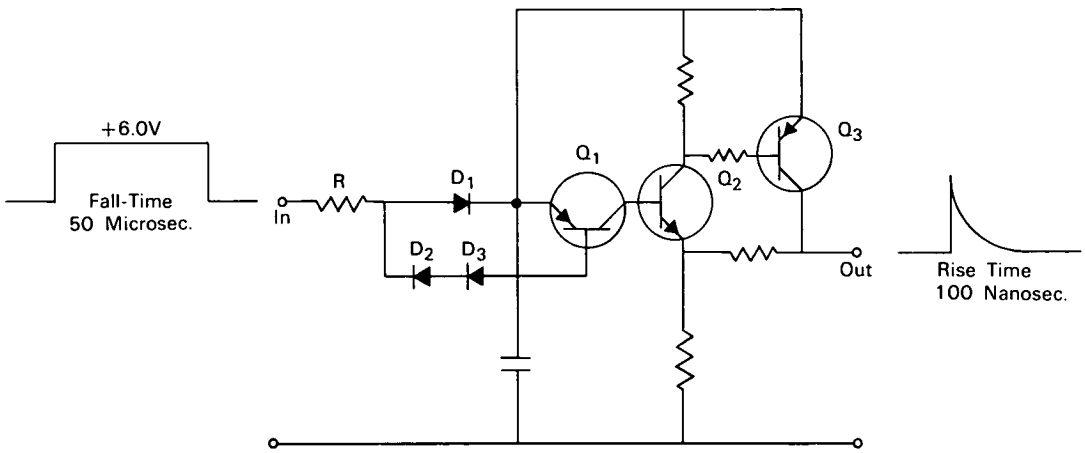
NASA TECH BRIEF

Synchronized Pulse Generator Needs No External Power



The problem: Devising a circuit that does not require the use of external power to generate a fast rise-time pulse synchronized with an input pulse of relatively slow rise and fall times.

The solution: A simple circuit having a high input impedance and a low output impedance.

How it's done: The diagram illustrates the circuit for generating a positive pulse during the fall time of the rectangular input pulse, which swings to zero from an amplitude of +6.0 volts. During the time the input pulse remains at this amplitude, charging current flows into the capacitor through the input resistor R and diode D_1. A large input impedance is obtained by making R large. By proper choice of the capacitance value, the capacitor will charge to approximately +6.0 volts in the time the input pulse remains at this voltage. In this time interval, all transistors are biased off so that the capacitor retains its charge. When the input signal drops from +6.0 volts to approximately +4.0 volts, so that diodes D_2 and D_3 are forward biased, transistor Q_1 conducts and puts out a signal which turns on amplifier stage Q_2-Q_3 to yield a sharply rising pulse. The effective supply voltage for the amplifier is obtained from the charge on the capacitor which drains exponentially through transistors Q_2 and Q_3 to produce a corresponding exponential fall in the output pulse.

Notes:

1. The circuit described above yields an output at the fall time of the input signal. An output may be obtained on the rise time of a negative going pulse by use of NPN transistors for Q_1 and Q_3, a PNP transistor for Q_2, and by reversing the polarity of diodes D_1, D_2, and D_3.
2. The point during the fall or rise time of the input signal at which an output pulse is obtained is determined by the forward voltage drop across diodes D_2 and D_3. This point may be varied by

(continued overleaf)

changing the number of diodes used in the D_1-D_2 position, or it may be made very stable by replacing these diodes with a zener diode.

3. A tunnel diode may be incorporated into the circuit for operation on an input pulse with a single polarity swing or an input pulse with a positive-to-negative swing.
4. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Goddard Space Flight Center
   Greenbelt, Maryland, 20771
   Reference: B65-10072

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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